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Youth Concerns and Responses to Self-Tracking Tools and Personal Informatics Systems

Kyrill Potapov
UCL Interaction Centre
University College London
kyrill.potapov@ucl.ac.uk

Victor R. Lee
Utah State University
Logan, UT 84322, USA
victor.lee@usu.edu

Asimina Vasalou
UCL Institute of Education
University College London
a.vasalou@ucl.ac.uk

Paul Marshall
University of Bristol
Bristol, UK
p.marshall@bristol.ac.uk

ABSTRACT

Though some work has looked at the implementation of personal informatics tools with youth and in schools, the approach has been prescriptive; students are pushed toward behaviour change intervention or otherwise use the data for prescribed learning in a particular curriculum area. This has left a gap around how young people may themselves choose to use personal informatics tools in ways relevant to their own concerns. We gave workshops on personal informatics to 13 adolescents at two secondary schools in London, UK. We asked them to use a commercial personal informatics app to track something they chose that they thought might impact their learning. Our participants proved competent and versatile users of personal informatics tools. They tracked their feelings, tech activity, physical activity, and sleep with many using the process as a system for understanding and validating aspects of their own lives, rather than changing them.

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KEYWORDS

Personal informatics; self-tracking; youth; education

How long I slept	Days in a row I've done something	How nice my dinner was
How long I spent on an app	What music I've listened to	Which books I've read
Places I've been	What I ate and when	What I revised
Number of steps I walk	How many times I checked my phone	How many times I insulted someone
What I am grateful for	How cold it is in my room	What I spent money on
Who I talked to this week	My mood today	How long I spent on a task

Figure 1: Prompts for what participants could track

1 INTRODUCTION

Personal informatics (PI) is the practice of collecting and reflecting on personal data such as step count and sleep duration [10]. Though a number of studies have shown youth and school students are responsive to PI tools when introduced by researchers and developers [5, 8, 12], few have explored how young people could apply these tools in service of their own concerns and for use cases outside of what HCI researchers have originally envisioned for them (exceptions include [7]). This late breaking work reports on an early effort to address that gap.

2 BACKGROUND

Researchers and designers have tended to frame PI as a practice focused on behaviour change [10]. The primary strand of work bringing PI into contact with young people has followed this model, using the systems to promote a particular behaviour, such as physical activity [3, 5, 15] or lesson focus [4]. Another strand of work has used PI as a resource to facilitate curriculum-based learning [2, 8]. There has however been less focus on how young people may use PI systems for purposes not prescribed by a researcher. What goals do youth pursue when provided with a PI system and what meanings do they give to data?

These are important questions to consider, as we already know that adult practitioners of PI often engage with their tools for a wide range of idiosyncratic reasons not anticipated by designers and researchers [14]. Self-tracking can form part of various identities for the user with which they engage in their practice [11]. Yet at the same time, adults have different concerns and life routines than young people. As it stands currently, there is a gap in the literature around how young users, when they are free to choose how they engage, make sense of and enact their own PI practices.

3 METHOD

3.1 Participants

Secondary school students (aged 14-16) at two schools in London, UK were invited, by their class teacher, to take part in a study about apps and learning. They joined the study by returning letters of their and parental consent (approved by an institutional review board). Twenty students joined the study, thirteen of whom (5 female; 8 male) completed the study to interview stage. The study took place in a classroom at the participants' schools.

3.2 Procedure

Following previous models [7, 11] participants were enculturated in PI before engaging in self-tracking themselves. They developed their knowledge of PI through six twenty-minute participatory design workshops [15] in which students were presented with self-tracking practices and discussed them to consider their potential relevance to their own life at school. They were offered prompts

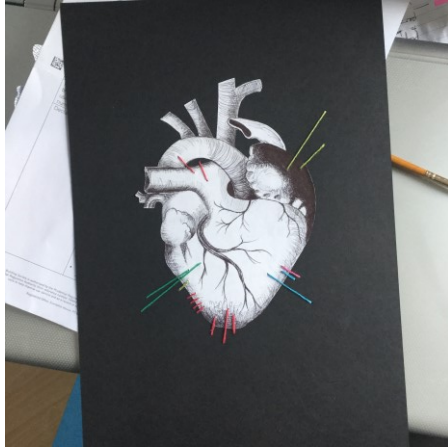


Figure 2: Visualization brought to workshop by P1, Strings represent category (colour) and intensity (length) of worries.

Quote 1: “I’m using my phone just what I’m using it for, so having the ability to track it, to me, it’s fairly redundant. Because you know, I can see and I know I spend most of my time on a certain app. That’s what I want to do.” (P12 talking about RescueTime: an app usage tracking tool)

Quote 2: “It’s like... so I run, and we have a little saying with Strava: If it’s not on Strava, it didn’t happen. Like if you didn’t track it and put it online, it didn’t actually happen. It’s like if this thing isn’t recorded to me, if my usage isn’t recorded, I can easily dismiss it.” (P12)

(Figure 1) that suggested what they could track and chose one they predicted would impact their learning. The researcher suggested a free commercial app they could use to carry out this tracking or lent an activity monitor to take home and use (for six to eight weeks). During a later session they fed back their initial impressions of self-tracking and used these to design their own self-tracking app/visualization. The design process involved identifying factors they would like to be able to track and designing visualizations they would use for their data (Figures 2 & 3). The purpose of this design work was to improve participant understanding of and creativity with self-tracking tools. After the workshops, participants were invited to continue tracking a factor of their choice for a further four to eight weeks. They were free to change the factor or self-tracking tool. One-to-one semi-structured interviews focused on how self-tracking went and what they learned from their data. Interviews were audio-recorded, transcribed and inductively thematically analysed [1].

4 FINDINGS

Participants used a combined twelve self-tracking apps and devices (Table 1) for a broad range of aims. Most participants were able to form and maintain a self-tracking practice and draw insights from the data they collected. The kinds of insights participants made often extended beyond the study’s framing around learning. Our findings suggest that PI has a value for young people that is not best described as either a behaviour change intervention nor a curriculum resource. Personal insight was a more prominent concern in their use of self-tracking. The various overlapping modes of engagement for gaining insight with personal data, inductively identified from the interview data, are described below.

4.1 Confirmation

Most participants found that the data they collected confirmed rather than challenged their expectations. For some participants, this meant that the data they collected was trivial or unnecessary (Quote 1).

P12 was already aware at least qualitatively, that he spent more time using his mobile device for certain purposes more than others (e.g., socializing vs. work productivity). However, there were other times in the data that participants found that the external confirmation helped to constitute a practice they might not otherwise maintain. These different modes of engagement could appear in the same individual (Quote 2).

Even though it was not the dominant use, many participants suggested that self-tracking tools could help maintain everyday practice around tasks that might be difficult or undesirable by “holding you accountable” (P5). Some characterized this as being like the “gentle nagging” (P3) of an authority figure like a teacher. For youth, there appeared to be some power dynamic associated with some judgments made with the data even when they were both the producer and interpreter of the data.

Quote 3: *“I find it helpful especially if I’m doing sports to just look at what it’s doing. I want to see if I’m being healthy or not. If I’m making bad or good choices when I’m just in everyday life. Fitbit just makes that a lot easier.”* (P2)

Quote 4: *“I actually gave the Fitbit a go, but then I gave up because it didn’t show the steps properly and I didn’t reach my target of ten thousand.”* (P10)

Quote 5: *“I think when it comes to self-tracking, there’s basically three stages. There’s understanding, control and change. Understanding is you basically figure out what’s wrong with you, control is controlling that, allowing yourself, just doing a few changes...”* (P6)

Quote 6: *“When I’m feeling pressure, I go on RescueTime and see what I’ve been doing... after you’ve started realising that you’ve been doing all your work on time you realise actually RescueTime has been helping you... feel less stressed.”* (P8)

Quote 7: *“Well, funnily enough, you can’t see it so well on here, but I actually start to worry less throughout the week because realizing how much I worry actually made me figure out how much time I waste [worrying].”* (P1)

The tools were keeping them responsible for sanctioned behaviour (e.g., completing schoolwork). This was probably the closest to behaviour change that we observed in the data, though the emphasis here was on behaviour management rather than change.

However, returning to the more prominent theme of personal insight, some participants explicitly preferred apps that let you “*see your own natural patterns of doing things*” (P4) as the basis for further reflection rather than judging your data for you and making recommendations. There, behaviour change was not the primary goal. Personal insight and awareness of how one behaved was the goal.

4.2 Mediation of judgements

As suggested above, some participants described their self-tracking data as exerting a normative force that made explicit whether they were doing what they ought to be.

These judgements can call upon knowledge the user already held (for instance, about health or productivity) and mediate its application in reflecting on their own actions (Quote 3).

Some participants abandoned their self-tracking tool because it contradicted their own judgements of their actions. For example, P10 (see Quote 4) played football and cycled to school and felt that his Fitbit should validate the good of these actions by showing he had reached his step target. He abandoned the tool when it failed to do so. This suggests that while tools were given some epistemic authority about what happened, should they conflict with what youth otherwise knew was true, they could end the youth user’s reliance on and trust in the tool.

4.3 Prompting experimentation

Consistent with self-tracking practices and the model of PI systems [10], several participants carried out behavioural experiments: altering some aspect of their everyday routines for the purpose of assessing the impact. For example, going for a walk or changing bed times. Participants referred to “correlations” and other maths and science knowledge to explain the meaning of their data (with varying coherence and appropriateness). Others used implicit deficit models as rationale for tracking behaviour change (Quote 5). Though they communicated scientific concepts [18] appropriate to PI, some participants could not yet apply them to their own practice without additional support. For instance, P7 described the importance of measuring the correlation between her sleep and wellbeing but had not considered how wellbeing could be measured. The workshop format supported participants in expressing and testing such models in drawing meaning from their practice.

4.4 Alleviating negative judgements

For some participants, self-tracking proved potentially therapeutic in prompting reflection that reframed feelings or behaviours they judged bad (Quote 6). The data helped to externalize negative judgements to potentially help users build a new relationship to them (Quote 7).

Quote 8: “It also made me less guilty knowing that I spent for example two hours on revision. And then I can have a break and have fifteen minutes on social media.” (P3)

Quote 9: “Even if I don’t get up and do anything, I still feel like it is this kind of anxiety so I know what it’s like, and I can watch a video online or just maybe do some drawing. So even if it’s not a big correlation of ‘this causes this’, you still know you have certain choices and you can remind yourself because you’re actually sitting down and tracking it.” (P9)

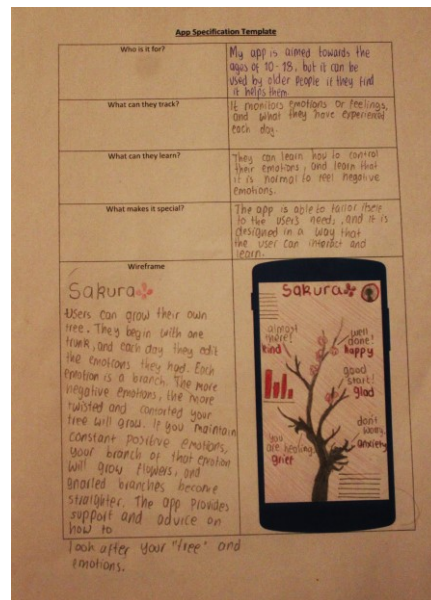


Figure 3: Worksheets helped to scaffold design discussions

Participants also reported that the normative force of the tool warranted some action that would not otherwise be judged acceptable or appropriate. Tracking data allowed for some personal transactions to take place between time that had been “well-used” and time used in less adult-sanctioned ways (Quote 8).

By explicating and validating some aspect of the user’s everyday actions and feelings, the self-tracking practice was able to act as a ground for self-understanding. One participant used *Multi Log* to develop a 1 to 5 scale for tracking her anxiety. This process helped her discern the quality of individual episodes of anxiety; such knowledge brought a sense of empowerment (Quote 9).

PI enabled some participants to report feeling a sense of control over some aspect of their life through the personal knowledge they brought to bear upon it, as mediated by their tool.

5 DISCUSSION

While they were asked to consider how PI and self-tracking could be used for learning, the more open collaborative design and experimentation process revealed that youth had a diverse set of concerns and responses to self-tracking and their own data. Some youth saw the data as opportunities to pursue and monitor change, making their uses consistent with some of the most widely recognized models of PI systems. They had begun to appropriate scientific concepts and systems as units of analysis for their own lived experiences [18]. Others found the information to be unsurprising, confirmatory, or contrary to what they felt was already true.

What appeared to be most prominent for the young people in the study was that self-tracking provided some information about their existing tendencies and behaviours. This did not necessarily mean that behaviour change was what they wanted next. At times, they framed the data as a form of personal currency for rationalizing how they use their time. For other youth, it made them recognize some patterns in their time.

Concerns around identity and authority were common. The youth were interested to learn more about their selves. They also saw the data and tools they used as providing ‘nagging’ and creating accountabilities, some of which was welcome and some not.

Ultimately, what appears noteworthy with youth using PI tools compared to adults seems to be the reconciliation of still-forming personal identities in a world where much of what is considered good or desirable is still framed by adults [9]. When personal realizations fit with the framings of adults, such as being productive at “work”, then youth could find validation in their tracked behaviours (as it was for P3). When they felt they were doing something worthwhile that did not get tracked, that led to some reconciliatory work where the tracking could be rejected, as had been the case with P10. They did not actively pursue behaviour change as would be expected in PI systems models [10]. They had more concern for how they as individuals fit with social norms that shaped who they were and how the technology could help negotiate them [17].

Thus, this late breaking work suggests that the most effective designs of PI systems for youth

	Tools used	Focus of tracking	Still tracking?
P1	TapLog	Worries	No
P2	Fitbit	Exercise	Yes
P3	RescueTime, Fitbit	Online activity, steps	Yes
P4	Samsung Health, Daylio	Steps, mood	Yes
P5	RescueTime, HabitBull	Online activity, habits	Yes
P6	Daylio, Moves	Mood, steps	Yes
P7	Misfit, Toggl	Steps, sleep, time revising	No
P8	RescueTime	Productivity	Yes
P9	RescueTime, Taplog, Multi Log	Revision quality, anxiety level	Yes
P10	Fitbit	Exercise	No
P11	RescueTime, TapLog	Productivity, times distracted	No
P12	RescueTime, Strava	App usage, running	Yes
P13	RescueTime, Toggl	Productivity, time revising	Yes

Table 1: Self-tracking apps and devices used by participants, what was tracked and whether they were still engaged in self-tracking at the time of interview. (Though these signifiers don't fully describe the kids' evolving activities).

may be intentionally supportive of youth identity work and provide young people with a sense that what they are tracking is consistent with what they know and who they aspire to be.

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